It is believed that no fee is due. If this is incorrect, the Commissioner is hereby authorized to charge any fees which may be required by this paper to Deposit Account No. 50-0856.

Respectfully submitted,

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Date: March 7th, 2005

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MARKED UP PARAGRAPHS

The tubes 12 and 14 extend the entire length of the flexible connector 10. At each end thereof there is ~~provide~~ provided a sleeve 16. The function of the sleeves 16 is to facilitate manipulation of the flexible connector 10 both during connection thereof to other instrumentalities and during use.

In accordance with another embodiment of the invention the end piece and the sleeve comprise an integral structure. A polymeric sleeve is received over the distal end of the ~~corrugating~~ corrugated tubing, and a length of mesh tubing is extended over the length of the corrugated tube and over the polymeric sleeve. The subassembly comprising the corrugated tube, the polymeric sleeve, and the mesh tubing is positioned within the sleeve and the sleeve is crimped to complete the assembly of the flexible connector.

The flexible connector 30 includes a length of corrugated tubing 32 which extends substantially the entire length of the flexible connector 30. The length of corrugated tubing 32 may be formed from stainless steel, bronze, brass, carbon, monel, other metals, various polymeric materials, and other materials that will not be adversely affected by the fluid that will flow through the flexible connector 30. In most instances an end piece 34 is provided at each end of the length of corrugated tubing 32. Those skilled in the art will recognize the fact that the end piece 34 is representative only and ~~at~~ that various types and kinds of end pieces can be utilized in the practice of the invention. The end piece 34 is provided with a proximal end 36 having a plurality of corrugations 38.

After the flexible tube tubing 40 has been positioned to retain the proximal end 36 of the end piece 34 in engagement with the distal end of the length of corrugated tubing 32, a length of mesh tubing 42 is extended over the entire length of the length of stainless steel corrugated tubing 32, and over the entire length of the flexible tubing 40, and over the corrugations 38 of the end piece 34. The length of mesh tubing may be formed from stainless steel, KAYNAR®, nylon, various textiles, or other materials depending on the requirements of particular applications of the invention. Assuming that an end piece is positioned at the opposite end of the length of corrugated tubing 32 and that the end piece at the opposite end of the length <u>of corrugated</u> tubing 32 also has corrugation similar to the corrugations 38, the length of mesh tubing [[32]] <u>42</u> also extends beyond the end of the length of corrugated tubing 32 and over the corrugations of the end piece positioned in engagement therewith.

following the positioning of the length of mesh tubing 42

over the length of ~~resilient~~ flexible tubing 40 and over the proximal end 36 of the end piece 34 and the distal end of the length of corrugated tubing 32, a sleeve 44 is positioned over the distal end of the length of mesh tubing 42 and in alignment with the length of flexible tubing 46. The results of the foregoing steps are illustrated in Figure 3. The sleeve 44 may be formed from stainless steel, copper, bronze, brass, steel, or other materials depending on the requirements of particular applications of the invention.

Following the assembly steps described in the preceding paragraphs, the partially finished flexible connector 30 is positioned in a crimping die 46. Those skilled in the art will understand and appreciate the fact that the crimping die 46 is diagrammatically illustrated in Figure 4, and that the actual crimping die will not necessarily have the appearance shown in Figure 4. The function of the crimping die 46 is to crimp the sleeve [[46]] 44 into permanent gripping engagement with the distal end of the length of mesh tubing 42, the length of ~~resilient~~ flexible tubing 40, the corrugations 38 comprising the proximal end 36 of the end piece 34, and the corrugations comprising the distal end of the length of corrugated tubing 32. The crimping of the sleeve [[46]] 44 therefore permanently retains the proximal end of the end piece in engagement with the distal end of the corrugated tubing 32 ~~tube 42~~. Thus, following actuation of the crimping die 46 at the opposite ends thereof, the fabrication of the flexible connector 30 is complete.

In the case of flexible connectors intended for low pressure applications, the length of mesh tubing 42 can be omitted. In such instances the sleeve [[46]] 44 is aligned with the length of ~~resilient~~ flexible tubing 40, the corrugations 38 comprising the proximal end 36 of the end piece 34, and the corrugations comprising the distal end of a length of corrugated tubing [[34]] 32. The sleeve [[46]] 44 is then crimped in the manner diagrammatically illustrated in Figure 4 thereby permanently securing the component parts of the flexible connector in place.

Referring to Figures 5 and 6, there is shown a flexible connector 50 comprising a second embodiment of the present invention. The flexible connector 50 includes a length of corrugated tubing 52 which extends substantially the entire length of the flexible connector 50. The flexible connector 50 will typically include an end piece 54 positioned at each end of the length of ~~flexible~~ corrugated tubing 52. Those skilled in the art will appreciate the fact that the end piece 54 is representative only and that various types and kinds of end pieces may be utilized in the practice of the invention.

Regardless of the type or kind of end piece that is utilized in the construction of the flexible connector 50, the end piece 54 is preferably provided with a proximal end 56 having a plurality of corrugations 58 formed thereon. An initial step in the manufacture of the flexible connector 50 comprises the engagement of the proximal end 56 of the end piece [[50]] 54 with the distal end of length of corrugated tubing 52. Thereafter a length of heat shrink polymeric tubing 60 is moved axially along the length of corrugated tubing 52 until it extends over the corrugations 58 of the proximal end of the end piece [[50]] 54 and the corrugations comprising the distal end of the length of stainless steel corrugated tubing 52.

Referring specifically to Figure 6, after the length of heat shrink tubing 60 is positioned over the proximal end 56 of the end piece [[50]] 54 and the distal end of the length of corrugated tubing 52, a radiation source 62 is utilized to heat the length of heat shrink tubing 60. Heating of the length of heat shrink tubing 60 causes the heat shrink tubing 60 to retract or shrink into rigid engagement with the distal end of the length of corrugated tubing 52 and the proximal end of the end piece [[50]] 54 thereby securing the distal end of the length of corrugated tubing 52 in engagement with the proximal end of the end piece [[50]] 54.

The succeeding steps in the manufacture of the flexible connector 50 are the same as the latter steps in the manufacture of the flexible connector 30 as illustrated in Figures 2, 3, and 4 and described hereinabove in conjunction therewith. Thus, the next step in the manufacture of the flexible connector 50 may involve extending a length of mesh tubing along the entire length of the length of corrugated tubing 52 and over the proximal ends 56 of the end pieces 54 comprising the flexible connector 50. Thereafter, a sleeve similar to the stainless steel sleeve 44 of Figures 2, 3, and 4 is positioned over the distal end of the length of corrugated tubing 52, the distal end of the length of mesh tubing (if used), the proximal end of the end piece 54, and the now-shrunk length of heat shrink tubing 60. The final step in the manufacture of the flexible connector 50 comprises the crimping of the sleeve as illustrated in Figure 4 and described hereinabove in conjunction therewith. In low pressure applications the length of mesh tubing may be omitted.

Referring to Figures 7, 8, and 9, inclusive, there is shown a flexible connector 70 comprising a third embodiment of the invention. The flexible connecter 70 differs from the embodiment of the invention illustrated in Figures 2-4, inclusive, and described hereinabove in connection therewith in that the flexible connector 70 includes a sleeve 72 formed integrally with an end piece 74. The end piece 74 includes a connecting portion 76 which may be flanged as shown in Figure 1B, or threaded, or grooved, or otherwise constructed depending upon the requirements of particular applications of the invention. The function of the connecting section is to secure the flexible connector 70 in engagement with an adjacent component which may comprise a pump, a nozzle, etc. The end piece 74 further includes a section 78 which may be hexagonal in shape or otherwise configured for mating engagement with a tool to facilitate engagement of the connecting ~~section~~ portion 76 with the adjacent component.

ABSTRACT

A flexible connector comprises a length of corrugated tubing, a polymeric sleeve aligned with the distal end of the length of corrugated tubing, and a length of mesh tubing extending the entire ~~of the~~ length of corrugated tubing and over the polymeric sleeve. The distal end of the corrugated tubing, the polymeric sleeve, and the distal end of the length of mesh tubing are received in a sleeve which is formed integrally with an end piece. The sleeve is crimped into permanent retaining engagement with the length of corrugated tubing, the polymeric sleeve, and the length of mesh tubing. The end piece functions to secure the flexible connector into engagement with an adjacent component.